

We Claim:

1       1. A mechanical seal comprising a rotating ring and a mating ring adapted to seal to one another,  
2       wherein:

3           (a) said mating ring comprises a first stationary ring comprising a circumferential groove-  
4           channel, a seal face, and an outer and inner surface each having a plurality of symmetrically-  
5           spaced radial holes adapted respectively to form inlet and outlet ports, and a second stationary  
6           ring comprising a circumferential diverter;

7           (b) said circumferential groove-channel is adapted to receive said circumferential diverter so  
8           that, when combined, said first and said second stationary rings form said mating ring having  
9           a circumferential, divergent flow-channel communicating with said inlet and said outlet ports;  
10           and

11           (c) if a coolant is supplied to said divergent flow-channel through said inlet ports, said  
12           divergent flow-channel causes the coolant to flow to substantially all portions of the interior  
13           surface area of said seal face before exiting through said outlet ports;

14       whereby heat transfer at the interface of said rotating ring and said mating ring is substantially greater  
15       than what would be the heat transfer between otherwise identical sealing members lacking said  
16       divergent flow-channel.

1       2. A mechanical seal as recited in claim 1, wherein said first and said second stationary rings  
2       are adapted to be shrink-fitted together.

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1       3.     A mechanical seal as recited in claim 1, wherein said first stationary ring and said second  
2     stationary rings are adapted to be threaded together.

1       4.     A mechanical seal as recited in claim 1, additionally comprising a coolant selected from the  
2     group consisting of air, nitrogen, water, ethylene glycol, propane, and lubricating oil.

1       5.     A mechanical seal as recited in claim 1, wherein said mating ring is adapted to use air as a  
2     coolant.

1       6.     A mechanical seal as recited in claim 1, wherein said mating ring is coated with a Ti-  
2     containing amorphous hydrocarbon.

1       7.     A mechanical seal as recited in claim 1, wherein said first stationary ring has at least sixteen  
2     inlet and sixteen outlet ports.

1       8.     A mechanical seal as recited in claim 1, wherein said circumferential, divergent flow-channel  
2     is adapted to induce an agitated coolant flow pattern.

1       9.     A mechanical seal as recited in claim 1, wherein said circumferential, divergent flow-channel  
2     is adapted to induce a turbulent coolant flow pattern